

**What is claimed is:**

**1. An aligning drive mechanism, wherein**

a guide hole (10) as a reference surface for aligning is formed in a housing (6),

an output member (13) is inserted into the guide hole (10) axially movably,

5 the output member (13) is provided with a plurality of guided portions (21, 22) axially at intervals,

an annular aligning space (31, 32), which narrows in either one axial direction, is formed between at least one of the guided portions (21, 22) and the guide hole (10),

a shuttle member (41, 42), which is diametrically expandable and contractible, is

10 inserted into the aligning space (31, 32), the shuttle member (41, 42) is supported on either one of the guide hole (10) or the guided portion (21, 22) axially movably, and adapted to make a tapering engagement with the other (21, 22 or 10),

the shuttle member (41, 42) is urged by an urging means (51, 52) in such a direction as to tighten the tapering engagement,

15 the output member (13) is adapted to be axially reciprocatable by a driving means (D).

**2. The aligning drive mechanism as set forth in claim 1, wherein**

the guide hole (10) is composed of a first guide hole (11) and a second guide hole (12), the diameter of which is larger than that of the first guide hole (11),

20 a plurality of the guided portions are composed of a first guided portion (21) corresponding to the first guide hole (11) and a second guided portion (22) corresponding to the second guide hole (12),

the annular aligning space (31) is formed between the first guide hole (11) and the first guided portion (21), the shuttle member (41) is inserted into the aligning space (31).

**25 3. The aligning drive mechanism as set forth in claim 2, wherein**

the annular aligning space (32) is formed between the second guide hole (12) and the second guided portion (22), and the shuttle member (42) is inserted into the aligning space (32).

**4. The aligning drive mechanism as set forth in claim 1, wherein**

30 a straight surface (45, 46) of the shuttle member (41, 42) is movably supported on the guide hole (10), and a tapered surface (47, 48) of the shuttle member (41, 42) is adapted to make a tapering engagement with the guided portion (21, 22).

**5. The aligning drive mechanism as set forth in claim 1, wherein**

a straight surface (45, 46) of the shuttle member (41, 42) is movably supported on

the guided portion (21, 22), and a tapered surface (47, 48) of the shuttle member (41, 42) is adapted to make a tapering engagement with the guide hole (10).

6. The aligning drive mechanism as set forth in claim 1, wherein

the output member (13) is adapted to be movable with load toward a base end, the annular aligning space (31, 32) is formed in such a manner as the tapering engagement to be tightened during the movement with load toward the base end.

7. The aligning drive mechanism as set forth in claim 1, wherein

the output member (13) is adapted to be movable with load toward a base end, the annular aligning space (31, 32) is formed in such a manner as the tapering engagement to be loosened during the movement with load toward the base end.

8. The aligning drive mechanism as set forth in claim 1, wherein

the output member (13) is adapted to be movable with load toward a leading end, the annular aligning space (31, 32) is formed in such a manner as the tapering engagement to be tightened during the movement with load toward the leading end.

15 9. The aligning drive mechanism as set forth in claim 1, wherein

the output member (13) is adapted to be movable with load toward a leading end, the annular aligning space (31, 32) is formed in such a manner as the tapering engagement to be loosened during the movement with load toward the leading end.

10 10. A positioning apparatus having the aligning drive mechanism set forth in claim 6 or 7, wherein

a reference block (1) as a fixed side is provided with the housing (6), an annular plug (9), which is to be inserted into a positioning hole (3) of a movable block (2), is projected from the housing (6) toward a leading end,

an output portion (16) of the output member (13) is inserted into the annular plug (9), a wedge surface (55) is provided on a periphery of the output portion (16) in such a manner that the wedge surface (55) gets closer to the axis toward the base end,

30 a plurality of pressing members (56) are supported on a peripheral wall (9a) of the annular plug (9) circumferentially at intervals and radially movably, the wedge surface (55) is adapted to make a wedge engagement with the pressing members (56), the pressing members (56) are adapted to be restorable radially inward by a returning means (58).

11. The positioning apparatus as set forth in claim 10, wherein

the annular plug (9) having a ceiling wall (9b) is fixed to the housing (6).

12. The positioning apparatus as set forth in claim 10, wherein

the annular plug (9) having a ceiling wall (9b) is supported on the housing (6)

axially movably within a predetermined range, and the annular plug (9) is pressed toward the leading end by an advancing means (72).

13. A positioning apparatus having the aligning drive mechanism set forth in claim 6 or 7, wherein

5           a reference block (1) as a fixed side is provided with the housing (6), an annular collet (90), which is to be inserted into a positioning hole (3) of a movable block (2), is supported on the housing (6) axially movably within a predetermined range, the annular collet (90) is pressed toward a leading end by an advancing means (72),

10          an output portion (16) of the output member (13) is inserted into the annular collet (90), a wedge surface (55) is provided on a periphery of the output portion (16) in such a manner that the wedge surface (55) gets closer to the axis toward the base end,

              a pressing portion (92), which engages with the positioning hole (3), is provided on a peripheral surface of the annular collet (90).

14. The positioning apparatus as set forth in claim 13, wherein

15          the annular collet (90) is integrally formed with at least one slit (91), and adapted to be contractible by either one of its own elastic restoring force or a returning means (94).

15. The positioning apparatus as set forth in claim 13, wherein

              the annular collet (90) is composed of a plurality of divided members (96) arranged circumferentially, and adapted to be contractible by a returning means (94).

20          16. The positioning apparatus as set forth in claim 10, wherein

              the wedge surface (55) is formed with a tapered outer peripheral surface.

17. The positioning apparatus as set forth in claim 10, wherein

              a plurality of the wedge surfaces (55) are arranged circumferentially at intervals.

18. The positioning apparatus as set forth in claim 17, wherein

25          a plurality of inclined grooves (75) are provided on the output portion (16) of the output member (13) circumferentially at intervals, and the wedge surface (55) is formed on a bottom wall (75a) of the inclined groove (75).

19. The positioning apparatus as set forth in claim 18, wherein

              the returning means (58) is formed with a fitting structure between a peripheral wall of the inclined groove (75) and the pressing member (56).

20. The positioning apparatus as set forth in claim 11, wherein

              a supply port (62) for a cleaning fluid is provided in the housing (6), a discharge port (64) for the cleaning fluid is formed with a fitting gap between the peripheral wall (9a) of the annular plug (9) and the pressing member (56), and the discharge port (64) is adapted to

communicate with the supply port (62).

21. The positioning apparatus as set forth in claim 12, wherein

a supply port (62) for a cleaning fluid is provided in the housing (6), a discharge port (64) for the cleaning fluid is formed with a fitting gap between the peripheral wall (9a) of the annular plug (9) and the pressing member (56), and the discharge port (64) is adapted to communicate with the supply port (62).

22. The positioning apparatus as set forth in claim 13, wherein

a supply port (62) for a cleaning fluid is provided in the housing (6), a discharge port (64) for the cleaning fluid is formed in the peripheral wall of the annular collet (90), and the discharge port (64) is adapted to communicate with the supply port (62).